

A short geological account of the various sands and gravels obtained is given by Mr. R. H. Worth, together with a determination of the  $\text{CaCO}_3$  (which in these deposits is nearly all of organic origin) in deposits of varying degrees of fineness. Several partial analyses of silts are also given.

Mr. Allen clearly appreciates the great importance of the character of the silt, which forms so large a part of the food of many creatures living on the sea-bottom, and it is to be hoped that in course of time he may be able to attempt a systematic survey of the silts in the neighbourhood of Plymouth, so as to tell us not only more about their chemical composition, but more about their physical character, and about the organisms they contain. He has already made an important advance in our knowledge by showing that "coccoliths" occur in shallow water deposits very much more frequently than has hitherto been believed; but many other organisms, such for example as the various bacteria which exist in these deposits, are likely to be of considerable importance as part of the biological environment; and of these we know practically nothing.

Having given a detailed description of the nature of the sea-bottom at eighteen selected places in the small area dealt with, Mr. Allen gives a complete list of the species obtained at each locality as the result of a number of dredgings, together with an estimate of the relative abundance of the various species. This complicated information has been admirably digested, and it is so tabulated that the reader can see with very little trouble the relation between the abundance of any species and the character of the bottom deposits or of the fauna of adjacent localities.

The work is deliberately limited to a small area, where the conditions of life are tolerably uniform throughout, and statements are made which lead one to hope that this is only a first instalment of a more extended survey.

Every one who cares about the problems of marine zoology will hope that Mr. Allen may be able before very long to publish his promised account of the region between the thirty-fathom line and the shore, so that the relation between the littoral fauna and the fauna he has now described may be determined. As it stands, however, his work is a solid and valuable contribution to a kind of knowledge which must be largely increased before we can hope to understand the bionomics of the sea.

#### THE OLD RED SANDSTONE OF SHETLAND.

THOUGH abounding in ill-preserved plant remains, the Old Red Sandstone rocks of Shetland have hitherto yielded none of those characteristic fossil fishes which would enable us to compare them with rocks of similar age elsewhere in Scotland. On the general evidence of lithological features and the supposed identity of their respective floras, they have been regarded usually as a northward extension of the "Orcadian" beds of Caithness and the Orkneys. Two years ago Mr. John S. Flett, M.B., B.Sc., of Edinburgh University, was able to report that he had found certain obscure fish remains in Shetland, and, this summer, assisted by a grant from the Royal Society of London to defray the expenses of quarrying, he has succeeded in obtaining a number of undoubted fish-remains from the flag-stones of Brissay, near Lerwick. In this collection, which consists mostly of broken and detached plates, Dr. R. H. Traquair, F.R.S., has recognised fragments of an *Asterolepis* (probably a new species) and of *Holonema*, a fish new to Britain, but occurring in the Chemung (Upper Devonian) of North America. A full description of these will, no doubt, shortly be forthcoming. In the meantime, it seems certain that the fauna of these beds

is distinct from any fauna of Old Red age at present known in Britain, and, until more fully investigated, its horizon remains open to question; but Mr. Flett inclines to believe that its real position will turn out to be intermediate between the John-o'-Groat's beds (the highest of the Orcadian series of the Orkneys) and the true Upper Old Red of Moray and Elgin. The genus *Asterolepis*, so characteristic of the Upper Old Red, was shown by him two years ago to occur also in the Thurso beds of the Orkneys, and the general forms of the Shetland flora would indicate a connection with the Orcadian. Nevertheless, the whole aspect of the fauna is Upper Old Red; not one of the commoner Orcadian fishes has been obtained in Shetland. An interesting problem is opened up by these discoveries, to which it is to be hoped further investigations will furnish a definite solution.

SIR J. WILLIAM DAWSON, C.M.G., LL.D.,  
F.R.S., &c.

NEWS has been received of the death of Sir William Dawson, Emeritus Principal and Chancellor of McGill University, Montreal, and the most distinguished of Canadian geologists. He was the son of James Dawson, of Picton, a town on the northern shores of Nova Scotia, where he was born in October 1820.

Coming to this country in early youth he studied at the University of Edinburgh, and gained a knowledge of geology and allied sciences from Robert Jameson, then Regius Professor of Natural History. Returning to his native land, Dawson became Superintendent of Education in Nova Scotia from 1850 to 1853; and later on Professor of Geology and Principal of McGill College and University 1855 to 1893.

On his return to Nova Scotia he directed his attention with the greatest enthusiasm to the study of geology, for as early as 1845 we find him communicating to the Geological Society of London papers on the Coal-formation of the country. To this formation for many years he gave especial study. In company with Sir Charles Lyell he made in 1852 a detailed examination of the fine succession of "fossil forests" of the Coal-period in the cliffs of South Joggins. Together they obtained also the first remains in the Coal-measures of an "air-breathing reptile," named *Dendropteron*, which was found in the interior of one of the erect *Sigillariæ*; a single species of land-shell, *Pupa vetusta*, was found in the same situation.

Zealously pursuing his observations, Dawson was enabled to issue in 1855 his well-known work entitled "Acadian Geology: an account of the Geological Structure and Mineral Resources of Nova Scotia." A third edition of this work was published in 1878.

In 1854 he became a Fellow of the Geological Society of London, and it is noteworthy that all his leading discoveries, before and afterwards, were brought before this Society. His contributions to geological science were many, and though dealing largely with fossil plants, with footprints and impressions of various animals, he also wrote concerning the higher forms of life, and devoted much attention to the phenomena of the Glacial period.

In 1862 Dawson was elected a Fellow of the Royal Society. Two years later his name was rendered familiar to every student of geology by the announcement of the discovery of an organism in the oldest known rocks, the Laurentian of Canada. As early as 1859 Sir William Logan had expressed his opinion that traces of organic structure were to be found in Laurentian limestone; but it was not until 1864 that Dr. Dawson determined by the aid of the microscope that the structure was that of a Foraminifer. He then gave to the "fossil" the name *Eozoon Canadense*, and his opinion was strongly

supported by Dr. W. B. Carpenter and Prof. T. Rupert Jones. It is needless here to refer more particularly to the controversy that took place regarding this supposed organism; suffice it to say that for many years the fossil was figured as an organism in most text-books, and was considered to be the oldest evidence of life on the earth. If we turn to Prof. Lapworth's "Intermediate Text-book of Geology, 1899," p. 182, we still find a figure of "Eozoon"; but the author remarks: "the organic nature of *Eozoon* is discredited by most geologists, and the preponderance of scientific opinion has long been in favour of regarding it as a peculiar mineral structure, imitative of the organic." Dawson himself, however, in the *Geological Magazine* for 1895, still boldly upheld the animal nature of *Eozoon*.

In 1881 the Council of the Geological Society awarded to Dr. Dawson the Lyell Medal, the President (Mr. Etheridge) remarking on the value of his researches on the fossil flora of the Carboniferous and older rocks of Canada. In 1884 Dr. Dawson published a series of articles, and afterwards a small volume, on the geology of Egypt and Syria, but for the most part his original contributions relate to Canadian geology.

In addition to his Acadian Geology, he was author of several other more or less popular volumes, including "Archæia; or Studies of the Cosmogony and Natural History of the Hebrew Scriptures" (1860); "The Story of the Earth and Man" (1873, and many later editions); "The Dawn of Life" (1875); "Fossil Men and their modern Representatives" (1880); "Geological History of Plants" (1888); "Relics of Primeval Life" (1897).

Dr. Dawson was appointed C.M.G. in 1881, and he was knighted in 1884 on the first occasion when the British Association paid a visit to Canada. He was elected President of the Association for the Birmingham meeting in 1886.

He died November 19, in his eightieth year. His son, Dr. G. M. Dawson, C.M.G., F.R.S., is the distinguished and energetic Director of the Geological Survey of Canada. H. B. W.

### THE LEONIDS.

THE following communications have reached us with reference to the Leonid meteors observed last week:—

#### MR. DENNING'S REPORT.

It may be safely said that no meteoric display was ever so generally looked for and awaited with so much interest as the one which has just occurred. That the character of it should have proved disappointing is to be regretted, and especially so after the previous failures in 1897 and 1898. The astronomical world had been eagerly anticipating the event for many months, and the curiosity of the general public had been excited by articles in the newspapers pointing out, perhaps too confidently, that the meteors would appear in such amazing numbers that the event would form one of the most striking spectacles of a lifetime. Every one therefore sat up to see the shooting stars, but all more or less failed to realise the expectations they had formed. Some people saw nothing, for clouds or fog hid the moon, stars and meteors on the nights of November 14 and 15. Others had a clearer sky and a dazzling moon, but the grand display of meteors was entirely wanting. The constellation of Leo could be distinctly seen as it rose higher in the east, but meteoric stars only shot at intervals from the familiar "sickle." We had expected that the whole firmament would be furrowed with these "Leonids," as it was in 1799, 1833 and 1866; but instead of a heavy bombardment, there was only weak, desultory firing, and when, in the grey dawn of November 16 observers discontinued their vigils, it was with a feel-

ing of regret; moderated, however, by the knowledge that better success might attend similar efforts in 1900 and 1901.

A large number of reports have been received from observers in different parts of the country. Observations were commenced on November 6 by Prof. A. S. Herschel, at Slough, and in three hours he counted twenty-eight meteors after 14h. on that night, but there was no sign of the Leonids. On November 8 he watched for two hours after 13h. 45m., and saw seventeen meteors, but still no indication of radiation from Leo. On the same night Mr. Besley, at Clapham, watched between 10h. 55m. and 13h. 10m., and counted twenty-two meteors, including seven Taurids and possibly two Leonids.

On November 10 further observations were secured by Prof. Herschel and Mr. Besley, as well as by Mr. T. H. Astbury, at Wallingford, and by the writer at Bristol. An aggregate of seventy-two meteors was seen, including perhaps two Leonids; but it is often very difficult to identify true Leonids from the same swift, streak-leaving meteors directed from other radiants in the neighbouring region of sky.

On November 11, in two hours between 14h. 30m. and 16h. 30m., the writer at Bristol noted ten meteors, including two certain Leonids. One of these at 14h. 52m. was a well-observed foreshortened path from  $158^{\circ}+15^{\circ}$  to  $160^{\circ}+12^{\circ}$ , and would, in combination with the other Leonid, indicate the radiant at  $152^{\circ}+23^{\circ}$ . If this position is correct the radiant would appear to be a stationary one like that of the October Orionids.

On November 12 the sky was much clouded, but on November 13, between 17h. 8m. and 17h. 50m., Mr. J. E. Clark, at South Croydon, saw nine meteors (seven Leonids). At Bristol the S.W. sky was partly clear from 17h. 15m. to 18h., and five meteors (one Leonid) were counted. At Marlborough between 17h. 20m. and 18h. 30m. twenty-one meteors (eighteen Leonids) were seen by Mr. H. Savory. At Cambridge between 17h. and 18h. 25m. twenty-three meteors were counted by Mr. Hinks.

On November 14, Mr. T. H. Astbury, at Wallingford, registered twenty-five Leonids, and saw about a dozen more between 16h. 3m. and 17h. 53m. Sir W. J. Herschel, at Littlemore, Oxford, saw ninety-eight meteors (sixty-six Leonids) during the night. At Yeovil the sky was generally cloudy, but between 17h. and 18h. 30m. six meteors were seen crossing breaks in the clouds. Both at Littlemore and Yeovil a very fine non-Leonid was seen at 17h. 40m. At Worthing, Sussex, between 15h. and 18h. more than 200 Leonids were counted by Mr. A. R. Schulz. At Cambridge four observers watching from 12h. 5m. to 16h. 35m. observed forty-five meteors. At Brighton between 14h. 30m. and 18h. twenty-eight meteors (twenty-four Leonids) were noted by Dr. R. J. Ryle.

On November 15, 16 and 17, further observations were made, but meteors fell in very moderate numbers. They appear, in fact, to have been no more numerous than on mid-November nights in ordinary years when the comet is not far from aphelion.

Reports from foreign stations may possibly modify our present views and show that a fairly bright shower was observed elsewhere and during the daytime in England. But from a few descriptions already to hand from America and various parts of Europe it appears that the meagreness of the display formed a common experience even among observers situated in widely different longitudes.

There is every reason to suppose that though the shower has managed to elude us this year it must confront us next year, and possibly in 1901. It will be remembered that there were rich displays in 1866, 1867 and 1868. The one in 1866 occurred ten months after the parent comet of Tempel had passed through its